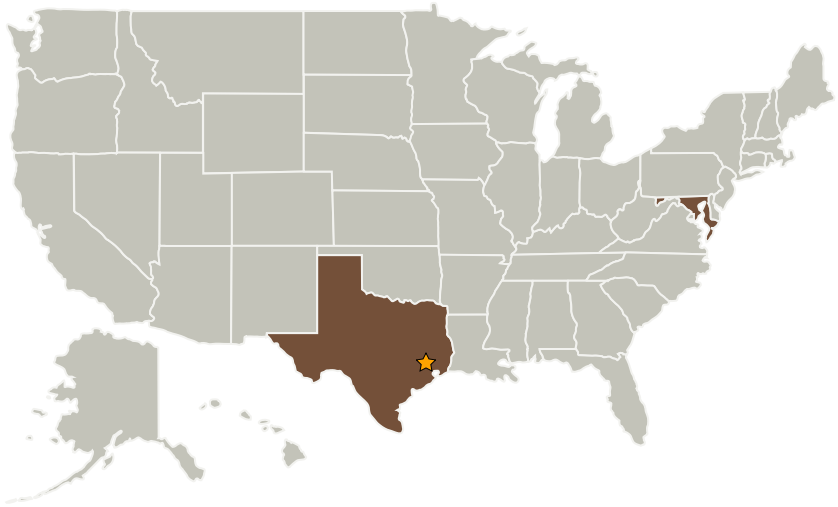
Visible Light Activated Photocatalytic Water Polishing System, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

This proposal targets development of a LED light activated photocatalytic water polishing system that enables reduction of organic impurities (TOC and microorganisms) in the processed water to levels less than 0.25 ppm for NASA?s future long duration mission. The proposed photocatalytic oxidation reactor is novel in two ways: 1) Strongly oxidative nanostructured TiON photocatalysts under visible light activation, which enables miniaturized water treatment devices utilizing energy efficient LEDs and/or solar radiation in space; and 2) A novel catalyst support approach that enables optimization of the structure to maximize exposed surface area and induce turbulent water flow for very high mass transfer rates. Rapid decomposition of organic contaminants in the water stream translates into a low energy, low volume, and lightweight method of polishing reclaimed water on manned spacecraft. In Phase I, TiON coated reticulated structures will be fabricated and evaluated in a test cell spiked with organic contaminants similar to those in process wastewater streams on board spacecraft using LEDs. Contaminant destruction rates will be compared for using different purification system such as photolysing and photocatalysis using titania and UV light. Phase I results will be used to design a pilot scale treatment system in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Technology Assessment & Transfer, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Annapolis, Maryland

Primary U.S. Work Locations	
Maryland	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Walter R Zimbeck

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management